

PHIL-19692

**SOIL INVESTIGATION FOR VOLATILE ORGANIC COMPOUND  
SOIL TO GROUNDWATER IMPACT  
for  
SITE 5 - FIRE TRAINING AREA**

**NAVAL AIR STATION JOINT RESERVE BASE  
WILLOW GROVE, PENNSYLVANIA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:  
Engineering Field Activity Northeast  
Environmental Branch, Code EV2  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop 82  
Lester, Pennsylvania 19113-2090**

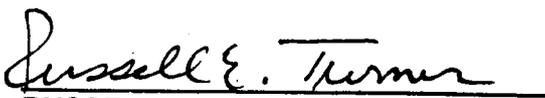
**Submitted by:  
Tetra Tech NUS, Inc.  
600 Clark Avenue, Suite 3  
King of Prussia, Pennsylvania 19406-1433**

**Contract No. N62472-03-D-0057  
Contract Task Order 003**

**March 2006**

**PREPARED UNDER DIRECTION OF:**

**APPROVED FOR SUBMISSION BY:**

  
**RUSSELL E. TURNER  
PROJECT MANAGER  
TETRA TECH NUS, INC.  
KING OF PRUSSIA, PENNSYLVANIA**

  
**JOHN J. TREPANOWSKI, P.E.  
PROGRAM MANAGER  
TETRA TECH NUS, INC.  
KING OF PRUSSIA, PENNSYLVANIA**

## TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
1.0	INTRODUCTION.....	1
2.0	SITE DESCRIPTION.....	2
3.0	SCOPE OF THE INVESTIGATION.....	2
4.0	SUMMARY OF FIELD INVESTIGATION .....	3
4.1	BOREHOLE DRILLING .....	3
4.2	SOIL SAMPLING AND ANALYSIS .....	4
4.2.1	Lithologic Analysis .....	4
4.2.2	Field Screening.....	4
4.2.3	Soil Sampling and Laboratory Analysis.....	4
5.0	RESULTS AND DISCUSSION .....	5
5.1	COMPARISON OF CURRENT AND HISTORICAL ANALYTICAL DATA.....	5
5.2	UPDATED SITE 5 CONCEPTUAL MODEL FOR SOILS .....	6
5.3	SUMMARY AND CONCLUSIONS.....	7

## APPENDICES

- A SURVEY DATA
- B BORING LOGS
- C SOIL SAMPLE LOG SHEETS
- D ANALYTICAL RESULTS

## TABLES

### NUMBER

- 1 Results of Photoionization Detector (PID) Headspace Screenings
- 2 Data Summary of Analytical Results Soil Borings of Former Drum Storage Area
- 3 Data Summary of Analytical Results Soil Borings of Former Burn Ring

## FIGURES

### NUMBER

- 1 Location of RI Sites
- 2 Soil Boring Locations

**SOIL INVESTIGATION FOR VOLATILE ORGANIC COMPOUND  
SOIL TO GROUNDWATER IMPACT  
SITE 5 - FIRE TRAINING AREA  
NAS JRB WILLOW GROVE  
HORSHAM TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA**

**1.0 INTRODUCTION**

Tetra Tech NUS (TtNUS) performed additional investigation of the soil at Site 5 (the former Fire Training Area) at the Naval Air Station Joint Reserve Base (NAS JRAB) Willow Grove, Pennsylvania. The work was performed under Contract Task Order No. 003 under Contract N62472-03-D-0057, Comprehensive Long-Term Environmental Action – Navy (CLEAN), in accordance with the approved Work Plan for Soil Investigation, Summer 2005, Volatile Organic Compound Soil to Groundwater Impact, Site 5 - Fire Training Area Soil, Operable Unit 4 (OU 4) (Tetra Tech NUS, December 2005). This work complements the previous remedial investigation work that is documented in the Remedial Investigation Report for Site 5 – Fire Training Area (Tetra Tech NUS, February 2002), and the Remedial Investigation Report for Sites 1, 2, 3, and 5 (Halliburton NUS, February 1993).

The purpose of this soil investigation was to address regulatory agency concerns regarding the quality of the historical analytical data for volatile organic compounds (VOCs) in Site 5 soil. Specifically, the Environmental Protection Agency (EPA) had concerns regarding the sampling methods used during the previous investigations, and requested that these locations be resampled with the EnCore™ sampling technique (a sampling method that was not available during the previous investigations) to confirm the historical results. EPA concerns included:

- Whether the analytical non-detections of VOCs from soil samples in the vicinity of the former burn ring could be false negatives. These samples were chosen in the field because of elevated photoionization detector (PID) responses observed during screening procedures.
- Whether the VOC concentrations reported for the soils containing positive detections could have been under-reported.
- Whether the VOC concentrations exceed the applicable benchmark screening concentrations for the soil-to-groundwater migration pathway.

## 2.0 SITE DESCRIPTION AND SETTING

NAS JRB Willow Grove is located in Horsham Township, Montgomery County, Pennsylvania, approximately 20 miles north of the city of Philadelphia. NAS JRB Willow Grove occupies 1,000 acres of the 1,200 acres maintained by the Department of Defense at the Air Station, and the Willow Grove Air Reserve Station occupies the remaining 200 acres (see Figure 1). The Air Station is generally bounded by State Route 611 (Easton Road) to the east, State Route 463 (Horsham Road) to the southwest, and Keith Valley Road to the north.

Site 5 is located in the south-central portion of NAS JRB, approximately midway between Runway 10/28 and Horsham Road. The site is located immediately south of Taxiway Juliet, and covers an irregularly shaped area of approximately 1.25 acres. The training area was used from 1942 to 1975 for firefighting exercises, which included the disposal and burning of flammable liquid wastes generated by the Naval Air Station. Wastes including solvents, paint chemicals, xylenes, toluene, and various petroleum compounds were reportedly consumed at the rate of at least 4,000 gallons per year. Drums were reportedly stored in the vicinity of the burn ring during the periods between firefighting exercises.

Site 5 is comprised of flat to slightly rolling terrain, and is primarily covered by grasses, buildings, and a parking lot, with some woody and brushy vegetation present within the southern portion of the area.

## 3.0 SCOPE OF THE INVESTIGATION

The field investigation was designed to gather additional analytical data from subsurface soils at selected locations that were sampled during previous investigations. These locations included:

- Soil boring locations where elevated PID readings were observed in the field, but no VOCs were subsequently detected during the laboratory analyses. These soils were resampled to confirm that VOCs are not present at these locations.
- Soil boring locations where elevated PID readings were observed in the field, and VOCs were subsequently detected during the laboratory analyses. These soils were resampled to confirm the accuracy of the previously reported concentrations.

The following field investigation tasks were completed to address the identified data gaps:

- Soil Borings (see Section 4.1). Six soil borings were drilled near the locations of selected historical borings (see Figure 2). Continuous soil cores were obtained from the ground surface to the top of bedrock at each boring location.
- Soil Sampling and Analysis (see Section 4.2). The soil cores were screened in the field with a PID. Based on these results, two soil samples were selected from each boring using the EnCore™ sampling technique, and submitted to a fixed-base analytical laboratory for VOC analyses.

#### 4.0 SUMMARY OF FIELD INVESTIGATION

The locations of the six soil borings are illustrated on Figure 2. Three of the borings (05SB-54, -55, and -56) are located in the vicinity of the former burn ring, where no VOCs have historically been detected, and three of the borings (05SB-51, -52, and -53) are located in the vicinity of the former drum storage area, where elevated concentrations of VOCs have historically been detected.

Each drilling location was cleared for subsurface utilities by NAS JRB personnel, and by contacting the Pennsylvania One-Call utility clearing system.

#### 4.1 BOREHOLE DRILLING

The drilling subcontractor was Vironex, Inc., of Bowie, Maryland. The soil borings were drilled by the direct push technology (DPT, or "Geoprobe") drilling method. With the DPT method, a sampling barrel fitted with an acetate core sleeve is hydraulically advanced (or pushed) into the subsurface to obtain a soil core. The barrel is withdrawn from the borehole, the acetate core sleeve is removed, a new core sleeve is inserted into the barrel, and the sampling assembly is reinserted into the borehole to obtain the next core. The borehole stayed open when the sampling assembly was withdrawn due to the clayey and silty nature of the soil. At each location, continuous soil samples or cores were collected from the ground surface to the top of bedrock (which was defined as hydraulic refusal, or the inability to further advance the barrel). The depths of the borings ranged from 18 to 23 feet in the vicinity of the former burn ring, and from 11 to 19 feet in the vicinity of the former drum storage area. At the conclusion of each boring, the borehole was backfilled with a mixture of soil cuttings and bentonite.

The soil borings were surveyed for horizontal location and vertical elevation by James M. Stewart, Inc. The survey data are presented in Appendix A.

## **4.2 SOIL SAMPLING AND ANALYSIS**

### **4.2.1 Lithologic Analysis**

The lithology of each core was described by the TTNUS geologist and noted on the boring log. The lithologies observed in the cores were consistent with those noted during previous site investigations, and consisted predominantly of fine-grained soils ranging from a silty clay to a sandy silt. The boring logs are included in Appendix B.

### **4.2.2 Field Screening**

Concurrent with the lithologic analysis, each core was field-screened for VOCs using a PID. These PID readings are recorded on the boring logs. In addition, headspace analyses were conducted for each core at two-foot intervals. To determine the headspace concentrations, a soil sample was placed in a clean glass jar and tightly covered with aluminum foil. The jar was then shaken to thoroughly mix the soil sample with the air in the headspace. After the sample was allowed to equilibrate for a period of 10 minutes, the foil was perforated by the PID and a headspace reading was recorded. The results of the headspace analyses are included in Table 1.

### **4.2.3 Soil Sampling and Laboratory Analysis**

Soil samples were collected (and preserved) every two feet from the entire borehole of each boring. Two soil samples from each boring were selected for VOC analysis by a fixed-base laboratory. One soil sample for laboratory analysis was taken from the interval displaying the highest headspace PID reading, and one soil sample was taken from the basal soils occurring immediately above the top of bedrock. No PID readings were noted at location 05SB56, so one sample was taken from the basal soils, and one sample was taken from the midpoint of the boring. All soil samples were obtained using the closed

sampling vessel (EnCore™) sampling technique and in accordance with the sampling procedures described in Appendix B of the work plan.

The samples ultimately selected for VOC analysis are shown in Table 1. The requisite QA/QC samples (including field duplicate, field blank, rinsate blank, and trip blank) were also taken and submitted as prescribed in the work plan. The sample log sheets are included in Appendix C.

The laboratory analyses were performed by Northeast Laboratory Services of Waterville, Maine (a Navy-certified laboratory) using SW-846 Method 8260B. The data were validated to EPA validation level M3 by TtNUS in accordance with EPA's national and regional protocol. The complete set of validated analytical data is presented in Appendix D.

## **5.0 RESULTS AND DISCUSSION**

The analytical data obtained through the EnCore™ sampling method for this current investigation are summarized in Table 2 (for the soil borings located in the vicinity of the former drum storage area) and Table 3 (for the soil borings located in the vicinity of the former burn ring). For comparison, these tables also include the historical analytical data from the corresponding previous borings (see Figure 2 for locations) that were obtained using the now-obsolete sampling methods.

### **5.1 COMPARISON OF CURRENT AND HISTORICAL ANALYTICAL DATA**

Overall, the current analytical data compare favorably with the historical data. Although no statistical comparisons of the data sets were conducted, the level of similarity in both the qualitative (presence versus absence) and quantitative (concentration) results indicate that all existing analytical data may be confidently used for the interpretation of site conditions.

Qualitatively, the list of compounds positively detected at each location in 2005 is similar to the compounds that were detected in 1997 or 1991. One exception to this trend occurred at boring location 05SB52 (2005), where 14 VOCs were detected, versus 05SB21 (1997), where 2 VOCs were detected. This difference, however, is due to the significantly higher detection limits that were reported for the 1997 sample.

Quantitatively, the VOC concentrations detected in 2005 are similar to the concentrations detected in 1997 or 1991. No sampling event displays consistently higher or lower concentrations than the other

sampling events, and the reported differences in concentrations are generally small. The exceedances (or non-exceedances) of benchmark criteria are consistent across the data sets. That is, the compounds that exceeded a benchmark concentration for the current sampling round typically exceeded the benchmark for the historical sampling round. Again, one exception to this trend was noted at location 05SB21, where the lower detection limits achieved for the current round resulted in the positive detection of 12 additional VOCs, and consequently a higher number of benchmark exceedances.

## 5.2 UPDATED SITE 5 CONCEPTUAL MODEL FOR SOILS

The analytical results of the current sampling event support the existing interpretation of Site 5 soil conditions as presented in the RI report (Tetra Tech NUS, February 2002). No significant changes to this interpretation are required.

The most significant VOC concentrations in the soil (based on the number of detected compounds, the VOC concentrations, and the number of benchmark screening criteria that are exceeded) are detected in the vicinity of the former drum storage area. Here, selected benchmark criteria were exceeded from subsurface depths as shallow as 1 foot (at 05SB52) to as deep as the overburden/bedrock interface (15 feet at 05SB53). In contrast, little VOC impact to the soils is detected in the vicinity of the former burn ring. In addition, the nature and extent of VOCs in the soil are very consistent with the nature and extent of VOCs in the resultant groundwater plume, where the former drum storage area (which consistently records the highest VOC concentrations for groundwater) is interpreted to be the source area of the plume.

During the scoping of this project, regulators questioned the lack of historical contamination detected in the vicinity of the burn ring, and noted that the highest VOC concentrations at most fire training sites are typically detected at the burn area. However, this investigation revealed that at NAS JRB, the burn ring has a competent steel bottom, and is actually a half-buried, soil-filled tank, rather than simply a steel partition encircling unlined native soil. The tank is interpreted to have prevented the infiltration of VOCs into the underlying native soil. Soil boring 05SB55 was placed near the tank's spill point (overflow pipe) to investigate whether VOCs may have spilled out of the tank, but the analytical results indicated no VOCs in the surface soils, and very low detections of 2 VOCs at the overburden/bedrock interface (2-butanone at 2.8J ug/L and methyl acetate at 5.2J ug/L).

### 5.3 SUMMARY AND CONCLUSIONS

The purpose of this investigation was to gather additional analytical data from subsurface soils at selected locations that were sampled during previous investigations. The objective of the resampling was to address regulatory concerns regarding the quality of the historical analytical data for VOCs because of the now-outdated sampling techniques that were used. The current samples were obtained using the EnCore™ sampling method.

One subset of soil samples were obtained from boring locations where elevated PID readings were previously observed in the field, but not VOCs were subsequently detected during the laboratory analyses. The results of the current investigation confirm that VOCs are not present in these areas.

One subset of soil samples were obtained from boring locations where elevated PID readings were previously observed in the field, and VOCs were subsequently detected during the laboratory analyses. The results of the current investigation confirm that VOCs are present in these areas at the approximate concentrations that had been previously reported.

In summary, the results of this investigation validate the historical data and indicate that all of these results may be used with confidence.

**TABLES**

**TABLE 1**  
**RESULTS OF PHOTOIONIZATION DETECTOR (PID) HEADSPACE SCREENINGS**  
**NAS JRB WILLOW GROVE SITE 5 - FIRE TRAINING AREA**

Boring	Depth	Headspace (PID, ppm)	Boring	Depth	Headspace (PID, ppm)
05SB51	0 - 1	187	05SB54	0 - 1**	310
	2 - 3	450		2 - 3	121
	4 - 5**	1013		4 - 5	7.8
	6 - 7	180		6 - 7	16.5
	8 - 9	61.9		8 - 9	0.4
	11 - 12	38.9		10 - 11	28.5
	12 - 13	18.7		12 - 13	17.4
	14 - 15	35.3		14 - 15	29.7
	16 - 17	0.0		16 - 17	0.0
	18 - 19**	0.0		17 - 18**	8.8
05SB52	0 - 1**	1523	05SB55	0 - 1**	43.2
	2 - 3	215		2 - 3	0.0
	4 - 5	21.2		4 - 5	2.2
	6 - 7	23.5		6 - 7	6.1
	8 - 9	24.1		8 - 9	0.0
	10 - 11**	82.6		10 - 11	15.4
05SB53	0 - 1	2.6		12 - 13	18.2
	2 - 3	22.7		14 - 15	8.5
	4 - 5	14.4		16 - 17	22.3
	6 - 7	18.0		18 - 19	17.7
	8 - 9	12.6	20 - 21	15.0	
	10 - 11**	22.9	22 - 23**	42.4	
	12 - 13	16.4			
	14 - 15**	34.2	05SB56	0 - 1	0.0
			2 - 3	0.0	
			4 - 5	0.0	
			6 - 7	0.0	
			8 - 9	0.0	
			10 - 11**	0.0	
			12 - 13	0.0	
			14 - 15	0.0	
			16 - 17	0.0	
			19 - 20**	0.0	

\*\* Interval selected for laboratory analysis.

TABLE 2

**DATA SUMMARY OF ANALYTICAL RESULTS  
VOLATILE ORGANIC COMPOUNDS (VOCs) IN SOIL  
NAS JRB WILLOW GROVE SITE 5 - FORMER FIRE TRAINING AREA**

**SOIL BORINGS LOCATED IN THE VICINITY OF THE FORMER DRUM STORAGE AREA**

Boring:	05SB51		05SB17		05SB52		05SB21	05SB53		05SB22	SCREENING LEVELS	
	2005		1997		2005		1997	2005		1997	EPA SSL	PADEP
	4 - 5	18 - 19	4 - 6	10 - 12	1 - 2	10 - 11	2 - 4	10 - 11	14 - 15	4 - 6		
1,1,1-Trichloroethane	10U	10U	12U	12U	<b>7300</b>	11U	1500U	<b>29</b>	<b>6.7J</b>	<b>140</b>	60000	7200
1,1,2-Trichloroethane	1U	<b>0.55J</b>	12U	12U	1U	<b>1.2</b>	1500U	10U	<b>0.9J</b>	<b>15</b>	0.78	150
1,1-Dichloroethane	<b>0.56J</b>	<b>4.2J</b>	12U	<b>11J</b>	<b>290J</b>	<b>1.1</b>	1500U	<b>120</b>	<b>48</b>	<b>160</b>	51000	650
1,1-Dichloroethene	10U	10U	12U	12U	<b>170J</b>	11U	1500U	<b>9.6J</b>	<b>2.4J</b>	<b>5J</b>	2900	190
1,2-Dichlorobenzene	10U	10U	NA	NA	10UJ	11U	NA	10U	11U	NA	4600	59000
1,2-Dichloroethane	1U	1U	12U	12U	1U	1.1U	1500U	1U	1.1U	12U	1	100
1,3-Dichlorobenzene	10U	10U	NA	NA	10UJ	11U	NA	10U	11U	NA	290	61000
2-Butanone	10U	10U	12U	12U	10U	11U	1500U	10U	<b>1.7J</b>	<b>55</b>	29000	54000
4-methyl-2-pentanone	10U	<b>0.56J</b>	12U	12U	10U	<b>3.8J</b>	1500U	10U	11U	12U	59000	2900
Acetone	2.9B	2.1B	<b>70</b>	12U	<b>47J</b>	4.7B	1500UJ	10U	6.3B	<b>140J</b>	2200	41000
Benzene	<b>28</b>	2U	<b>15</b>	<b>20J</b>	<b>20</b>	2.2U	1500U	<b>6.5</b>	<b>1.9J</b>	<b>19</b>	1.9	130
Bromomethane	2U	2U	12U	12U	2U	2.2U	1500U	2U	2.2U	12U	41	540
cis-1,2-Dichloroethene	10U	<b>1.3J</b>	12U (total)	12U (total)	<b>0.61J</b>	11U	1500U (total)	<b>45</b>	<b>16</b>	<b>120 (total)</b>	350	1600
Carbon Disulfide	10U	10U	12U	12U	<b>1.3J</b>	11U	1500U	10U	11U	12U	19000	160000
Cyclohexane	<b>29</b>	10U	NA	NA	<b>130</b>	11U	NA	<b>12</b>	<b>1.1J</b>	NA	--	--
Ethylbenzene	<b>130</b>	10U	<b>180</b>	<b>150J</b>	<b>1600</b>	11U	<b>3400</b>	10U	11U	<b>50</b>	15000	46000
Isopropylbenzene	10U	10U	NA	NA	10UJ	11U	NA	<b>5.9J</b>	<b>0.6J</b>	NA	64000	780000
Methyl Acetate	10U	10U	NA	NA	10U	11U	NA	10U	11U	NA	25000	690000
Methylcyclohexane	<b>160J</b>	10U	NA	NA	<b>4500</b>	11U	NA	<b>45</b>	<b>1.7J</b>	NA	--	--
MTBE	1U	1U	NA	NA	1U	1.1U	NA	1U	1.1U	NA	12	280
Styrene	10U	10U	12U	12U	10UJ	11U	1500U	10U	11U	12U	57000	24000
Tetrachloroethene	2U	2U	12U	12U	<b>11</b>	2.2U	1500U	<b>2.5</b>	2.2U	<b>10J</b>	4.7	430
Toluene	<b>1.2J</b>	10U	12U	12U	<b>17</b>	11U	1500U	10U	11U	<b>14</b>	8800	44000
Trichloroethene	1U	1U	12U	<b>8J</b>	<b>6</b>	1.1U	1500U	<b>4.4</b>	<b>1.1</b>	<b>2J</b>	0.26	170
Xylenes (total)	<b>320</b>	10U	<b>410</b>	<b>1100</b>	<b>16000</b>	11U	<b>16000</b>	10U	11U	<b>220</b>	3000	990000

## Notes:

All concentrations are reported in values of ug/KG.

Listed compounds have at least one positive detection in at least one sample. Target compounds with no positive detections are not listed.

EPA benchmarks are the Region 3 Soil Screening Levels (SSLs) for soil-to-groundwater migration at a dilution-attenuation factor (DAF) = 20.

PADEP benchmarks are the soil-to-groundwater generic values for a used, residential aquifer with TDS < 2500.

Concentrations reported for borings 05SB22, 05SB51 (4-5), and 05SB52 (10-11) are the highest reported concentrations from the field & field duplicate sample pair.

U = Compound was Undetected at the posted detection limit.

J = The reported concentration is estimated.

B = The reported detection was qualified as blanked through the data validation process.

NA = Not Analyzed

**Bolded concentrations represent positive detections.**

**Highlighted concentrations represent exceedances of at least one benchmark screening value.**

TABLE 3

**DATA SUMMARY OF ANALYTICAL RESULTS  
VOLATILE ORGANIC COMPOUNDS (VOCs) IN SOIL  
NAS JRB WILLOW GROVE SITE 5 - FORMER FIRE TRAINING AREA**

**SOIL BORINGS LOCATED IN THE VICINITY OF THE FORMER BURN RING**

Boring:	05SB54		05SB15		05SB55		05SB30	05SB56		No nearby historical borings	SCREENING LEVELS	
	2005		1991		2005		1997	2005			EPA SSL	PADEP
	0 - 1	17 - 18	0 - 2	4 - 6	0 - 1	22 - 23	4 - 6	10 - 11	19 - 20			
1,1,1-Trichloroethane	10UJ	10U	5U	6U	10U	10UJ	12U	10U	10U	--	60000	7200
1,1,2-Trichloroethane	1UJ	1U	5U	6U	1U	1U	12U	1U	1U	--	0.78	150
1,1-Dichloroethane	10UJ	10U	5U	6U	10U	10UJ	12U	<b>0.58J</b>	10U	--	51000	650
1,1-Dichloroethene	10UJ	10U	1B	6U	10U	10UJ	12U	10U	10U	--	2900	190
1,2-Dichlorobenzene	<b>1J</b>	10U	NA	NA	10U	10U	NA	10U	10U	--	4600	59000
1,2-Dichloroethane	1UJ	1U	5U	6U	1U	1UJ	12U	<b>7.8</b>	<b>3.7</b>	--	1	100
1,3-Dichlorobenzene	<b>0.98J</b>	10U	NA	NA	10U	10U	NA	10U	10U	--	290	61000
2-Butanone	<b>6.9J</b>	10U	10U	12U	10U	<b>2.8J</b>	12U	10U	10U	--	29000	54000
4-methyl-2-pentanone	10UJ	10U	10U	12U	10U	10U	12U	10U	10U	--	59000	2900
Acetone	<b>29J</b>	10U	10U	52B	10U	1B	<b>41J</b>	1.5B	10U	--	2200	41000
Benzene	2UJ	2U	5U	<b>1J</b>	2U	2UJ	12U	2U	2U	--	1.9	130
Bromomethane	2UJ	2U	10U	12U	2U	2UJ	12U	2U	2U	--	41	540
cis-1,2-Dichloroethene	10UJ	10U	5U (total)	6U (total)	10U	10UJ	12U (total)	10U	10U	--	350	1600
Carbon Disulfide	<b>1.6J</b>	10U	5U	<b>2J</b>	10U	10UJ	12U	10U	10U	--	19000	160000
Cyclohexane	10UJ	10U	NA	NA	10U	10UJ	NA	10U	10U	--	--	--
Ethylbenzene	10UJ	10U	5U	6U	10U	10U	<b>5J</b>	10U	10U	--	15000	46000
Isopropylbenzene	10UJ	10U	NA	NA	10U	10U	NA	10U	10U	--	64000	780000
Methyl Acetate	<b>11J</b>	10U	NA	NA	10U	<b>5.2J</b>	NA	10U	10U	--	25000	690000
Methylcyclohexane	10UJ	10U	NA	NA	10U	10UJ	NA	10U	10U	--	--	--
MTBE	<b>1.1J</b>	1U	NA	NA	1U	1UJ	NA	1U	1U	--	12	280
Styrene	10UJ	10U	5U	6U	10U	10U	12U	10U	10U	--	57000	24000
Tetrachloroethene	2UJ	2U	5U	6U	2U	2U	12U	2U	2U	--	4.7	430
Toluene	10UJ	10U	<b>1J</b>	6U	10U	10U	<b>2J</b>	10U	10U	--	8800	44000
Trichloroethene	1UJ	1U	5U	6U	1U	1U	12U	1U	1U	--	0.26	170
Xylenes (total)	<b>1J</b>	10U	5U	6U	10U	10U	<b>22</b>	10U	10U	--	3000	990000

## Notes:

All concentrations are reported in values of ug/KG.

Listed compounds have at least one positive detection in at least one sample. Target compounds with no positive detections are not listed.

EPA benchmarks are the Region 3 Soil Screening Levels (SSLs) for soil-to-groundwater migration at a dilution-attenuation factor (DAF) = 20.

PADEP benchmarks are the soil-to-groundwater generic values for a used, residential aquifer with TDS < 2500.

Concentrations reported for borings 05SB22, 05SB51 (4-5), and 05SB52 (10-11) are the highest reported concentrations from the field & field duplicate sample pair.

U = Compound was Undetected at the posted detection limit.

J = The reported concentration is estimated.

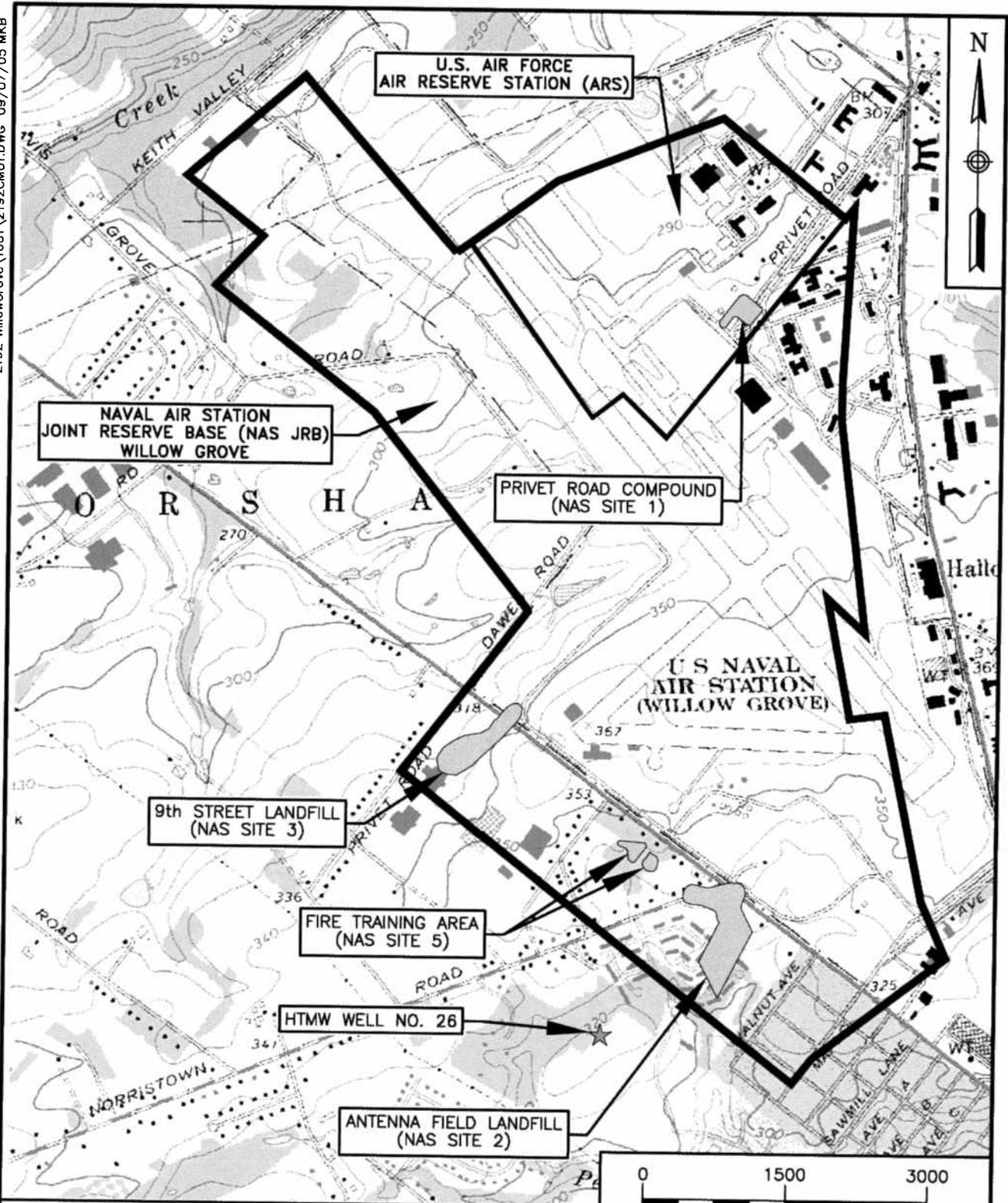
B = The reported detection was qualified as blanked through the data validation process.

NA = Not Analyzed

**Bolded concentrations represent positive detections.**

**Highlighted concentrations represent exceedances of at least one benchmark screening value.**

**FIGURES**



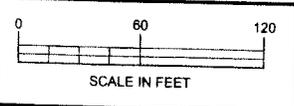
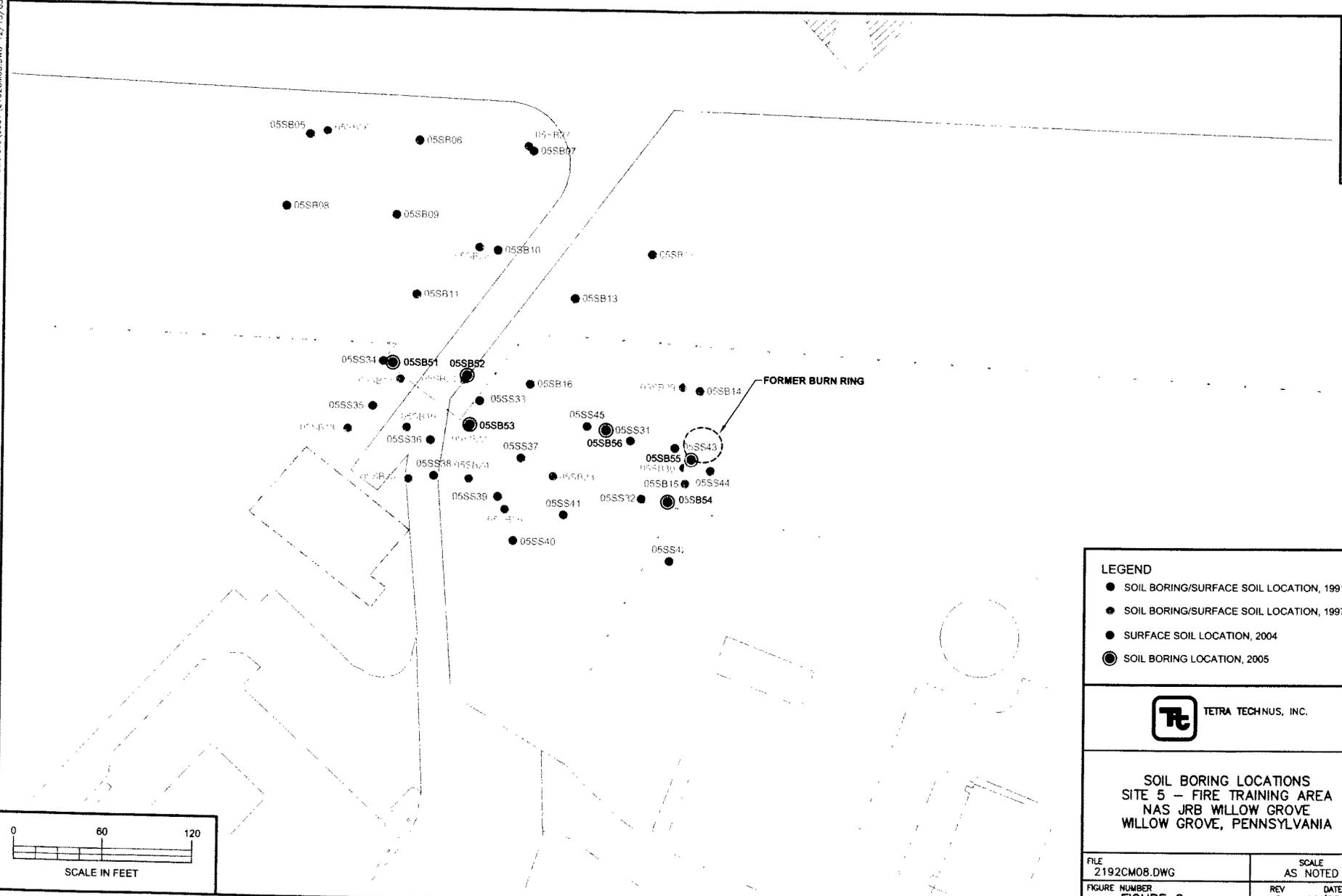
BASE MAP IS A PORTION OF THE AMBLER, PA U.S.G.S. 7.5 MINUTE QUADRANGLE MAP, DATED 1963, PHOTOREVISED IN 1983.

SCALE IN FEET



LOCATION OF RI SITES  
 NAS JRB WILLOW GROVE  
 WILLOW GROVE, PENNSYLVANIA

SCALE AS NOTED	
FILE 2192CM01.DWG	
REV 0	DATE 09/07/05
FIGURE NUMBER FIGURE 1	



- LEGEND**
- SOIL BORING/SURFACE SOIL LOCATION, 1991
  - SOIL BORING/SURFACE SOIL LOCATION, 1997
  - SURFACE SOIL LOCATION, 2004
  - SOIL BORING LOCATION, 2005



**SOIL BORING LOCATIONS  
SITE 5 - FIRE TRAINING AREA  
NAS JRB WILLOW GROVE  
WILLOW GROVE, PENNSYLVANIA**

FILE 2192CM08.DWG	SCALE AS NOTED
FIGURE NUMBER FIGURE 2	REV DATE 0 11/08/05

**APPENDIX A**

**SURVEY DATA**

# James M. Stewart, Inc. Land Surveyors

9622 Evans Street Philadelphia, PA 19115

Office 215 969 1577

Fax 215 969 0338

email [jmssurveys@comcast.net](mailto:jmssurveys@comcast.net)

**Willow Gove Naval Air Station**

**Site 05 - Fire Training Area**

**Willow Grove - Pennsylvania**

Project #: 3516

October 27, 2005

Horizontal Datum: Pennsylvania State Plane Coordinates NAD 83 - South Zone

Vertical Datum: NAVD 88

Sampling Point #	Elevation in Feet Ground	Coordinates in Feet		Date Of Survey
		Y North	X East	
05SS34	361.9	323644.92	2695450.73	July 22, 2004
05SS35	361.9	323614.25	2695443.85	July 22, 2004
05SS36	362.0	323591.61	2695483.35	July 22, 2004
05SS38	361.5	323567.57	2695485.79	July 22, 2004
05SS33	362.0	323618.74	2695516.29	July 22, 2004
05SS39	360.7	323553.99	2695529.13	July 22, 2004
05SS40	359.7	323524.41	2695539.84	July 22, 2004
05SS37	360.5	323580.41	2695544.52	July 22, 2004
05SS41	360.0	323542.27	2695573.68	July 22, 2004
05SS32	360.4	323553.71	2695626.21	July 22, 2004
05SS42	359.5	323511.89	2695645.56	July 22, 2004
05SS43	361.4	323588.51	2695648.65	July 22, 2004
05SS44	360.9	323573.29	2695673.71	July 22, 2004
05SS31	361.8	323592.99	2695618.46	July 22, 2004
05SS45	361.9	323602.42	2695589.04	July 22, 2004
05SB51	363.9	323643.89	2695457.12	October 27, 2005
05SB52	363.5	323635.93	2695507.70	October 27, 2005
05SB53	362.3	323602.56	2695509.80	October 27, 2005
05SB54	361.0	323552.01	2695644.15	October 27, 2005
05SB55	361.2	323580.86	2695660.44	October 27, 2005
05SB56	362.2	323600.07	2695602.04	October 27, 2005

**APPENDIX B**

**BORING LOGS**



# BORING LOG

PROJECT NAME: NASTRB Willow Grove (OU-5)

BORING No.: 055B51

PROJECT NUMBER: 2192

DATE: 12-18-05

DRILLING COMPANY: Vidrex

GEOLOGIST: Vince Shickora

DRILLING RIG: Geoprobe

DRILLER: Terje Sævi

Time

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole**
0810 S-1	1					Dark Brn	Silty Clay with grass roots and rock frags	moist	0	0	0	0
	2								63	0	0	0
	3					Brn	Clayey Silt with some F&R sand + rock frags	very moist	74	0	0	0
	4		46"/48"			Brn Gry	Same as above	moist	75	0	0	0
0832 S-2	5								133	0	0	0
	6					Brn Gry	Silty Clay with weathered Rock Frags	very moist	148	0	0	0
	7								151	0	0	0
	8		47"/48"			Red Brn	Clayey Silt with some F&R sand + Rock Frags	moist	140	0	0	0
0851 S-3	9								94	0	0	0
	10					Red Brn	Same as above	moist	88	0	0	0
	11								101	0	0	0
	12		47"/48"			Red Brn	Sandy Silt with highly weathered Rock Frags Trace Clay	moist to damp	122	0	0	0
0910 S-4	13								82	0	0	0
	14					Red Brn	Same as above (saprulite)	moist	86	0	0	0
	15								54	0	0	0
	16		46"/48"			Red Brn	Same as above (saprulite)	moist to damp	59	0	0	0
0922 S-5	17								11	0	0	0
	18								4.0	0	0	0
	19		30"/36"			Red Brn	Same as above (saprulite)	moist to damp	1.0	0	0	0
	20				FOB (refusal)							
	21											
	22											
	23											
	24											
	25											

\* When rock coring, enter rock brokenness.

\*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Direct Push sampling using 2" x 4' Acetate Sleeves

Drilling Area

Background (ppm):

Converted to Well: Yes  No

Well I.D. #: \_\_\_\_\_



# BORING LOG

PROJECT NAME: NASTRB Willow Grove  
 PROJECT NUMBER: 2192  
 DRILLING COMPANY: Vironex  
 DRILLING RIG: Geoprobe

BORING No.: 05SB52  
 DATE: 10-17-05  
 GEOLOGIST: Vince Shuckard  
 DRILLER: Jorge Sarto

Time

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**
1412	5-1	1			Red Brn		Silty Clay and gravel		very moist	0	0	0	0
		2								44	0	0	0
		3				Red Brn		Clayey silt with Trace F&R sized + Rock frags	very moist	21	0	0	0
		4		46" / 48"						20	0	0	0
1424	5-2	5			Grey Brn		Clay with some silt		very moist	11	0	0	0
		6								2.50	0	0	0
		7			Red Brn		Clayey silt with Trace weathered Rock frags		moist	2.9	0	0	0
		8		47" / 48"						3.0	0	0	0
1442	5-3	9			Red Brn		Same as above		very moist	15	0	0	0
		10								22	0	0	0
		11			Red Brn		Same as above with highly weathered Rock frags.		moist	27	0	0	0
1451	12			FOB (refusal)									
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												

\* When rock coring, enter rock brokenness.

\*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Direct push sampling using 2" x 4" Acetate Sleeves

Drilling Area Background (ppm): 0

Converted to Well: Yes  No  Well I.D. #: \_\_\_\_\_



# BORING LOG

PROJECT NAME: NASTAB Willow Grove (ou-5)

BORING No.: 055B53

PROJECT NUMBER: 2192

DATE: 10-17-05

DRILLING COMPANY: Vitrex

GEOLOGIST: Vince Shickora

DRILLING RIG: Geoprobe

DRILLER: Jorge Sarto

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**
1310	S-1	1	/			Dark Brn	Silty Clay with grass roots		Very moist	0	0	0	0
		2	/							0	0	0	0
		3	/			Org Brn	Clayey silt with Trace Rock Frag and FGR Sand		moist	0	0	0	0
		4	/	47% / 48"						0	0	0	0
1321	S-2	5	/			Org Brn	Silty clay with Trace weathered rock frags		Very moist	0	0	0	0
		6	/							0	0	0	0
		7	/			Red Brn	Clayey silt with Trace weathered rock frags		moist	0	0	0	0
		8	/	47% / 48"						0	0	0	0
1336	S-3	9	/			Red Brn	Same as above		Very moist	9.9	0	0	0
		10	/							8.7	0	0	0
		11	/							6.4	0	0	0
		12	/	45% / 48"		Red Brn	Same as above		Very moist	5.9	0	0	0
1347	S-4	13	/							7.7	0	0	0
		14	/			Red Brn	Silt with highly weathered rock		moist to damp	20.2	0	0	0
		15	/							4.4	0	0	0
1352		16	/										
		17	/		FoB (refusal)								
		18	/										
		19	/										
		20	/										
		21	/										
		22	/										
		23	/										
		24	/										
		25	/										

\* When rock coring, enter rock brokenness.

\*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Direct push sampling using 2" x 4' Acetate sleeves

Drilling Area Background (ppm): 0

Converted to Well: Yes  No  Well I.D. #: \_\_\_\_\_



# BORING LOG

PROJECT NAME: NASTAR Willow Grove  
 PROJECT NUMBER: 2192  
 DRILLING COMPANY: Virex  
 DRILLING RIG: Geoprobe

BORING No.: 055B54  
 DATE: 10-18-05  
 GEOLOGIST: Vince Shuckoff  
 DRILLER: Jorge Sonto

Time

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**
1228 S-1	1	/	/			Brn Blk	Silty clay with gravel and organic material		stained, very moist	10.00	0	0	
	2	/	/			Red Brn	Sandy silt with trace clay and rock frags		moist	10	0	0	0
	3	/	/							0	0	0	0
	4	/	/	39"/48"			Org Brn	Silty Sand with trace clay and rock frags		very moist	0	0	0
1239 S-2	5	/	/							0	0	0	0
	6	/	/			Brn Gry	Clayey silt with trace rock frags		very moist	0	0	0	0
	7	/	/							0	0	0	0
1249 S-3	8	/	/	46"/48"		Brn Gry	Same as above		very moist	0	0	0	0
	9	/	/							0	0	0	0
	10	/	/			Org Brn	Same as above		moist	0	0	0	0
1300 S-4	11	/	/							0	0	0	0
	12	/	/	48"/48"		Red Brn	Silty clay with some highly weathered rock frags		very moist	0	0	0	0
	13	/	/							0	0	0	0
	14	/	/			Red Brn	Clayey silt with highly weathered rock frags		moist	0	0	0	0
1320 S-5	15	/	/							0	0	0	0
	16	/	/	47"/48"		Red Brn	Same as above (sepiolite)		moist	0	0	0	0
	17	/	/							0	0	0	0
	18	/	/			Red Brn	Same as above		damp	0	0	0	0
	19	/	/							0	0	0	0
	20	/	/							0	0	0	0
	21	/	/										
	22	/	/										
	23	/	/										
	24	/	/										
	25	/	/										

EcB (refusal)

\* When rock coring, enter rock brokenness.  
 \*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.  
 Remarks: Direct push sampling using 2" x 4" Acetate Sleeves.

Drilling Area Background (ppm): 0

Converted to Well: Yes  No  Well I.D. #: \_\_\_\_\_



# BORING LOG

PROJECT NAME: NA-STRB Willow Grove (04-5)  
 PROJECT NUMBER: 2192  
 DRILLING COMPANY: Vironex  
 DRILLING RIG: Geoprobe

BORING No.: 05SB55  
 DATE: 10-18-05  
 GEOLOGIST: Vince Shuckard  
 DRILLER: Jerje Sortz

Time

1107

1119

1129

1139

1153

1207

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole**
5-1	1				Blk Gty	Sandy Clay and gravel		stained - fuel odor	9.5	0	0	0
	2				Red Brn	Silty clay with weathered Rock Fraggs		moist	0	0	0	0
	3								0	0	0	0
	4		30"/48"		Brn	Clayey Silt with some sand and Rock Fraggs		moist	0	0	0	0
5-2	5								0	0	0	0
	6				Org Brn	Same as above		moist	0	0	0	0
	7								0	0	0	0
	8		43"/48"		Org Brn	Clayey Silt		very moist	0	0	0	0
5-3	9				Org Brn	Silt with trace clay and weathered Rock Fraggs		moist	0	0	0	0
	10				Org Brn	Clayey Silt		very moist	0	0	0	0
	11								0	0	0	0
	12		47"/48"		Red Brn	Silt with trace clay and weathered Rock Fraggs		moist	0	0	0	0
5-4	13				Red Brn	Clayey Silt trace weathered rock Fraggs		moist	0	0	0	0
	14								0	0	0	0
	15				Red Brn	Silt some sand and highly weathered Rock Fraggs		damp to moist	0	0	0	0
	16		47"/48"						0	0	0	0
5-5	17				Red Brn	Same as above (Saprolite)		damp	0	0	0	0
	18								0	0	0	0
	19								0	0	0	0
	20		45"/48"		Red Brn	Same as above (Saprolite)		damp	0	0	0	0
5-6	21								0	0	0	0
	22				Red Brn	Same as above		damp	0	0	0	0
	23		34"/42"						0	0	0	0
	24				Red Brn	Same as above (Saprolite)			0	0	0	0
	25			EOB ( refusal )								

\* When rock coring, enter rock brokeness.

\*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: Direct push sampling using 2" x 4" Acetate Sleeves

Drilling Area  
 Background (ppm): 0

Converted to Well: Yes  No  Well I.D. #: \_\_\_\_\_



# BORING LOG

PROJECT NAME: NASTRB Willow Grove (0V-5)  
 PROJECT NUMBER: 2192  
 DRILLING COMPANY: Vironex  
 DRILLING RIG: Geoprobe

BORING No.: 055B56  
 DATE: 10-18-05  
 GEOLOGIST: Vince Shukert  
 DRILLER: Jorge Soto

Time  
0952

1005

1010

1030

1045

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)				
					Soil Density/ Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole**	Driller BZ**
S-1	1	/	/			Brn Gry	Sandy Silt and Clay with gravel / 5/25/200s		very moist	0	0	0	0
	2	/	/							0	0	0	0
	3	/	/			Red Brn	Clayey Silt with some FGR Sand + Rock Frag		moist	0	0	0	0
	4	/	40"/48"	/						0	0	0	0
S-2	5	/	/			Gry	Clayey silt with trace Rock Frag		moist	0	0	0	0
	6	/	/							0	0	0	0
	7	/	/			Brn Gry	Same as above		very moist	0	0	0	0
	8	/	47"/48"	/						0	0	0	0
S-3	9	/	/			Red Brn	Silt with trace clay and weathered Rock Frag		moist	0	0	0	0
	10	/	/							0	0	0	0
	11	/	/			Red Brn	Sandy Silt with some FGR Sand + Rock Frag		moist	0	0	0	0
	12	/	46"/48"	/						0	0	0	0
S-4	13	/	/			Red Brn	Silt with trace Sand Highly weathered Rock Frag		moist	0	0	0	0
	14	/	/							0	0	0	0
	15	/	/			Red Brn	Same as above (saprolite)		moist to damp	0	0	0	0
	16	/	47"/48"	/						0	0	0	0
S-5	17	/	/							0	0	0	0
	18	/	/			Red Brn	Same as above (saprolite)		moist to damp	0	0	0	0
	19	/	/							0	0	0	0
	20	/	/							0	0	0	0
	21	/	/		FOB (refused)								
	22	/	/										
	23	/	/										
	24	/	/										
	25	/	/										

\* When rock coring, enter rock brokenness.

\*\* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: Direct push sampling using 2" x 4' Acetate sleeves.

Drilling Area

Background (ppm): 0

Converted to Well: Yes  No

Well I.D. #: \_\_\_\_\_

**APPENDIX C**

**SOIL SAMPLE LOG SHEETS**



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B53-1011  
Sample Location: site 5  
Sampled By: V.Shickora/D.Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

**GRAB SAMPLE DATA:**

Date: <u>10-17-05</u>	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: <u>1333</u>	<u>10.5' BES</u>	<u>Red-Brown</u>	<u>Clayey silt with trace weathered rock frags (very moist)</u>
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>22.9</u>			

**COMPOSITE SAMPLE DATA:**

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

**OBSERVATIONS / NOTES:**

**MAP:**

Head Space Readings Off Sample - 22.9 ppm

(see work plan)

**Circle if Applicable:**

**Signature(s):**

MS/MSD	Duplicate ID No.:
<u>—</u>	<u>—</u>

[Signature]



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B53-1415  
Sample Location: site 5  
Sampled By: V.Shickora/D.Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-17-05</u>	<u>15' BGS</u>	<u>Red-Brown</u>	<u>Silt with highly weathered Rock Frags (moist to damp)</u>
Time: <u>1355</u>			
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>34.2</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

OBSERVATIONS / NOTES:

MAP:

Head Space Readings Off Sample - 34.2 ppm

(see Work Plan)

Circle if Applicable:

Signature(s):

MS/MSD   Duplicate ID No.:  

V. Shickora



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B52-0102  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

**GRAB SAMPLE DATA:**

Date: <u>10-17-05</u>	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: <u>1420</u>	<u>2' BGS</u>	<u>Red-Brown</u>	<u>Clayey Silt with Trace FGR and Rock Frags. (very moist)</u>
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>1523</u>			

**COMPOSITE SAMPLE DATA:**

Date: <u>NA</u>	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

**OBSERVATIONS / NOTES:**

**MAP:**

Head Space Readings Off Sample - 1,523 ppm  
Fuel oil/solvent odor from  
Sample material.

(see work plan)

**Circle if Applicable:**

**Signature(s):**

MS/MSD

Duplicate ID No.:



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B52-1011  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

**GRAB SAMPLE DATA:**

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-17-05</u>	<u>11' BES</u>	<u>Red-Brown</u>	<u>Clayey Silt with highly weathered Rock Fragments (moist)</u>
Time: <u>1454</u>			
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>82.6</u>			

**COMPOSITE SAMPLE DATA:**

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

**OBSERVATIONS / NOTES:**

Head Space Readings Off Sample - 82.6 ppm

**MAP:**

(see work plan)

Circle if Applicable:

MS/MSD <u>—</u>	Duplicate ID No.: <u>—</u>
--------------------	-------------------------------

Signature(s):  
[Signature]



Project Site Name: NASJRB Willow Grove Sample ID Number: TB10180501  
 Project Number: 2192 Sampled By: V. Shickora/D. Amate  
 Sample Location: Site 5 C.O.C. Number: \_\_\_\_\_  
 QA Sample Type:  
 Trip Blank  Rinsate Blank  
 Source Water Blank  Other Blank \_\_\_\_\_

SAMPLING DATA:	WATER SOURCE:
Date: <u>10-18-05</u> Time: <u>0738</u> Method: <u>Lab prepared</u>	<input checked="" type="checkbox"/> Laboratory Prepared <input type="checkbox"/> Tap <input type="checkbox"/> Purchased <input type="checkbox"/> Fire Hydrant <input type="checkbox"/> Other _____

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):	RINSATE INFORMATION (If Applicable):
Product Name: _____ Supplier: _____ Manufacturer: _____ Order Number: _____ Lot Number: _____ Expiration Date: _____	Media Type: _____ Equipment Used: _____ Equipment Type: <input type="checkbox"/> Dedicated <input type="checkbox"/> Reusable

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
Volatiles	Cool 4°C & HCl	3 X 40 ml vials	(YES) NO

OBSERVATIONS / NOTES:

Laboratory prepared Trip Blank

Signature(s): 



# QA SAMPLE LOG SHEET

Project Site Name: NASJRB Willow Grove Sample ID Number: FB10180501  
 Project Number: 2192 Sampled By: V.Shickora/D.Amate  
 Sample Location: Site 5 C.O.C. Number: \_\_\_\_\_  
 QA Sample Type:  
 Trip Blank  Rinsate Blank  
 Source Water Blank  Other Blank Field Blank

SAMPLING DATA:	WATER SOURCE:
Date: <u>10-18-05</u> Time: <u>0745</u> Method: <u>Direct Pour</u>	<input checked="" type="checkbox"/> Laboratory Prepared <input type="checkbox"/> Tap <input type="checkbox"/> Purchased <input type="checkbox"/> Fire Hydrant <input type="checkbox"/> Other _____

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):	RINSATE INFORMATION (If Applicable):
Product Name: _____ Supplier: _____ Manufacturer: _____ Order Number: _____ Lot Number: _____ Expiration Date: _____	Media Type: _____ Equipment Used: _____ Equipment Type: <input type="checkbox"/> Dedicated <input type="checkbox"/> Reusable

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
Volatiles	Cool 4°C & HCl	3 x 40 ml vials	<u>YES</u> NO

**OBSERVATIONS / NOTES:**  
Poured using Laboratory Supplied Blank Water.

Signature(s): [Signature]



# QA SAMPLE LOG SHEET

Project Site Name: NASJRB Willow Grove Sample ID Number: RB10180501  
 Project Number: 2192 Sampled By: V.Shickora/D.Amate  
 Sample Location: Site 5 C.O.C. Number: \_\_\_\_\_  
 QA Sample Type:  
 Trip Blank  Rinsate Blank  
 Source Water Blank  Other Blank \_\_\_\_\_

SAMPLING DATA:	WATER SOURCE:
----------------	---------------

Date: <u>10-18-05</u> Time: <u>1228</u> Method: <u>(see below)</u>	<input checked="" type="checkbox"/> Laboratory Prepared <input type="checkbox"/> Tap <input type="checkbox"/> Purchased <input type="checkbox"/> Fire Hydrant <input type="checkbox"/> Other _____
--	--

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):	RINSATE INFORMATION (If Applicable):
--	---

Product Name: _____ Supplier: _____ Manufacturer: _____ Order Number: _____ Lot Number: _____ Expiration Date: _____	Media Type: _____ Equipment Used: _____ Equipment Type: <input type="checkbox"/> Dedicated <input type="checkbox"/> Reusable
---	--

### SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles	Cool 4°C & HCl	3 X 40 ml vials	<u>YES</u> / NO

### OBSERVATIONS / NOTES:

Sample collected by pouring Laboratory supplied Blank water through clean Acetate sleeve and geoprobe sample head directly into sample bottleware.

Signature(s):



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B51-0405  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>5' BGS</u>	<u>Brown-Gray</u>	<u>Silty clay with weathered Rock frags. (very moist)</u>
<u>0837</u>			
<u>Method: Direct Push</u>			
<u>Monitor Reading (ppm): 1013</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
<u>Method:</u>				
<u>Monitor Readings (Range in ppm):</u>				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
<u>VOAs</u>	<u>5-Gram Encore</u>	<u>6</u>	<u>4°C</u>
<u>Dry Weight</u>	<u>4 oz Glass Jar</u>	<u>2</u>	<u>4°C</u>

OBSERVATIONS / NOTES:

MAP:

Head Space Readings Off Sample - 1,013 ppm  
fuel/solvent odor from sample material

(see work plan)

Circle if Applicable:

Signature(s):

MS/MSD  
—

Duplicate ID No.:  
Dup-02

[Signature]



Project Site Name: NASJRB Willow Grove Site 5  
 Project No.: 2192

Surface Soil  
 Subsurface Soil  
 Sediment  
 Other: \_\_\_\_\_  
 QA Sample Type: \_\_\_\_\_

Sample ID No.: 055B51-1819  
 Sample Location: site 5  
 Sampled By: V. Shickora/D. Amate  
 C.O.C. No.: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>19' BGS</u>	<u>Red-Brown</u>	<u>Sandy Silt with highly weathered Rock Fraggs (moist to damp)</u>
<u>Time: 0930</u>			
<u>Method: Direct Push</u>			
<u>Monitor Reading (ppm): 0.0</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
<u>Method:</u>				
<u>Monitor Readings (Range in ppm):</u>				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
<u>VOAs</u>	<u>5-Gram Encore</u>	<u>3</u>	<u>4°C</u>
<u>Dry Weight</u>	<u>4 oz Glass Jar</u>	<u>1</u>	<u>4°C</u>

OBSERVATIONS / NOTES:

MAP:

Head Space Readings Off Sample - 0.0 ppm

(see work plan)

Circle if Applicable:

Signature(s):

MS/MSD — Duplicate ID No.: —

[Signature]



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055B56-1011  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>10' BGS</u>	<u>Red-Brown</u>	<u>Sandy silt with some Rock frags. (moist)</u>
Time: <u>1025</u>			
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>0.0</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

OBSERVATIONS / NOTES:

MAP:

Head Space Readings Off Sample - 0.0 ppm

(see work Plan)

Circle if Applicable:

Signature(s):

MS/MSD:    Duplicate ID No.:   

CSA



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 05SB56-1920  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

- Type of Sample:
- Low Concentration
  - High Concentration

**GRAB SAMPLE DATA:**

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>20' BGS</u>	<u>Red-Brown</u>	<u>Silt with trace sand and highly weathered Rock frags. (moist to damp)</u>
Time: <u>1054</u>			
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>0.0</u>			

**COMPOSITE SAMPLE DATA:**

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

**OBSERVATIONS / NOTES:**

**MAP:**

Head Space Readings Off Sample - 0.0 ppm

(see work plan)

**Circle if Applicable:**

**Signature(s):**

MS/MSD

Duplicate ID No.: \_\_\_\_\_



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 05SB55-0001  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>1' BGS</u>	<u>Gray-Black</u>	<u>Sandy Clay and Gravel (very moist)</u>
Time: <u>1109</u>			
Method: <u>Direct Push</u>			
Monitor Reading (ppm): <u>43.2</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>3</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

OBSERVATIONS / NOTES:

Head Space Readings Off Sample - 43.2 ppm  
Black staining observed  
slight fuel/solvent odor.

MAP:

(see work plan)

Circle if Applicable:

MS/MSD    Duplicate ID No.:   

Signature(s): [Signature]



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 055055-2223  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

**GRAB SAMPLE DATA:**

Date:	Time:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>1216</u>	<u>23' BGS</u>	<u>Red-Brown</u>	<u>Silt with some sand and highly weathered Rock frags. (dano)</u>
Method: <u>Direct Push</u>				
Monitor Reading (ppm): <u>42.5</u>				

**COMPOSITE SAMPLE DATA:**

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
Method:				
Monitor Readings (Range in ppm):				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
VOAs	5-Gram Encore	<u>9</u>	4°C
Dry Weight	4 oz Glass Jar	<u>1</u>	4°C

**OBSERVATIONS / NOTES:**

**MAP:**

Head Space Readings Off Sample - 42.5 ppm

(See Work Plan)

**Circle if Applicable:**

**Signature(s):**

MS/MSD  
Yes

Duplicate ID No.: \_\_\_\_\_

WAF



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 05SB54-0001  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>1' BGS</u>	<u>Black-Brown</u>	<u>Silty Clay with Gravel and organic material. (very moist)</u>
<u>Time: 1232</u>			
<u>Method: Direct Push</u>			
<u>Monitor Reading (ppm): 310</u>			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
<u>Method:</u>				
<u>Monitor Readings (Range in ppm):</u>				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Preservative
<u>VOAs</u>	<u>5-Gram Encore</u>	<u>3</u>	<u>4°C</u>
<u>Dry Weight</u>	<u>4 oz Glass Jar</u>	<u>1</u>	<u>4°C</u>

OBSERVATIONS / NOTES:

Head Space Readings Off Sample - 310 ppm  
Black staining observed  
slight fuel / solvent odor

MAP:

(see work Plan)

Circle if Applicable:

MS/MSD - Duplicate ID No.: -

Signature(s):  
[Signature]



Project Site Name: NASJRB Willow Grove Site 5  
Project No.: 2192

Sample ID No.: 05.SB54-1718  
Sample Location: site 5  
Sampled By: V. Shickora/D. Amate  
C.O.C. No.: \_\_\_\_\_

- Surface Soil
- Subsurface Soil
- Sediment
- Other: \_\_\_\_\_
- QA Sample Type: \_\_\_\_\_

Type of Sample:  
 Low Concentration  
 High Concentration

**GRAB SAMPLE DATA:**

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>10-18-05</u>	<u>18' BGS</u>	<u>Red-Brown</u>	<u>Clayey silt with highly weathered rock frags (damp)</u>
<u>1328</u>			
<u>Method: Direct Push</u>			
<u>Monitor Reading (ppm): 8.8</u>			

**COMPOSITE SAMPLE DATA:**

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
<u>NA</u>				
<u>Method:</u>				
<u>Monitor Readings (Range in ppm):</u>				

**SAMPLE COLLECTION INFORMATION:**

Analysis	Container Requirements	Collected	Preservative
<u>VOAs</u>	<u>5-Gram Encore</u>	<u>3</u>	<u>4°C</u>
<u>Dry Weight</u>	<u>4 oz Glass Jar</u>	<u>1</u>	<u>4°C</u>

**OBSERVATIONS / NOTES:**

**MAP:**

Head Space Readings Off Sample - 8.8 ppm

(see work plan)

**Circle if Applicable:**

**Signature(s):**

MS/MSD

Duplicate ID No.:

—

—

*[Handwritten Signature]*

**APPENDIX D**

**ANALYTICAL RESULTS**

DATA SUMMARY OF ANALYTICAL RESULTS  
SITE 5 SOIL SAMPLES  
NAS JRB WILLOW GROVE, WILLOW GROVE, PENNSYLVANIA

Sample ID:	05SB51-0405	05SB51-0405-D	05SB51-1819	05SB52-0102	05SB52-1011	05SB53-1011	05SB53-1415	05SB54-0001	05SB54-1718	05SB55-0001
Sample Date:	10/18/05	10/18/05	10/18/05	10/17/05	10/17/05	10/17/05	10/17/05	10/18/05	10/18/05	10/18/05
Duplicate Of:	05SB51-0405-D	05SB51-0405								
Top Depth (feet):	4.0	4.0	18.0	1.0	10.0	10.0	14.0	0.0	17.0	0.0
Bottom Depth (feet):	5.0	5.0	19.0	2.0	11.0	11.0	15.0	1.0	18.0	1.0
VOLATILES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
1,1,1-Trichloroethane	10 U	10 U	10 U	7300	11 U	29	6.7 J	10 UJ	10 U	10 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 UJ	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
1,1,2-Trichloroethane	1 U	10 U	0.55 J	1 U	1.2	10 U	0.9 J	1 UJ	1 U	1 U
1,1,2-Trichlorotrifluoroethane	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
1,1-Dichloroethane	10 U	0.56 J	4.2 J	290 J	1.1 J	120	48	10 UJ	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	170 J	11 U	9.6 J	2.4 J	10 UJ	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	10 UJ	10 U	10 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 UJ	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	1 UJ	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
1,2-Dichloroethene (cis)	10 U	10 U	1.3 J	0.61 J	11 U	45	16	10 UJ	10 U	10 U
1,2-Dichloroethene (trans)	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
1,2-Dichloropropane	2 U	2 U	2 U	2 U	2.2 U	2 U	2.2 U	2 UJ	2 U	2 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	10 UJ	10 U	10 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 UJ	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
2-Butanone	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Acetone	2.9 B	10 U	2.1 B	47 J	4.7 B	10 U	11 U	10 UJ	10 U	10 U
Benzene	25	28	2 U	20	2.2 U	6.5	6.3 B	29 J	10 U	10 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
Bromoform	5 U	5 U	5 U	5 UJ	5.5 U	5 U	5.5 U	5 UJ	5 U	5 U
Bromomethane	2 U	2 U	2 U	2 U	2.2 U	2 U	2.2 U	2 UJ	2 U	2 U
Carbon Disulfide	10 U	10 U	10 U	1.3 J	11 U	10 U	11 U	10 UJ	10 U	10 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
Chlorobenzene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	10 UJ	10 U	10 U
Chloroethane	2 U	2 U	2 U	2 U	2.2 U	2 U	2.2 U	2 UJ	2 U	2 U
Chloroform	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
Chloromethane	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Cyclohexane	21	29	10 U	130	11 U	12	1.1 J	10 UJ	10 U	10 U
Dibromochloromethane	2 U	2 U	2 U	2 U	2.2 U	2 U	2.1 U	2 UJ	2 U	2 U
Dichlorodifluoromethane	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Ethylbenzene	130	120	10 U	1600	11 U	10 U	11 U	10 UJ	10 U	10 U
Isopropylbenzene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	10 UJ	10 U	10 U
Methyl Acetate	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Methyl Cyclohexane	94 J	160 J	10 U	4500	11 U	10 U	11 U	10 UJ	10 U	10 U
Methyl Tert-butyl Ether	1 U	1 U	1 U	1 U	1.1 U	1 U	1.1 U	1 UJ	1 U	1 U
Methylene Chloride	7.1 B	6.9 B	8.2 B	7.4 B	6.7 B	6.3 B	6.4 B	23 B	6.4 B	7 B
Styrene	10 U	10 U	10 U	10 UJ	11 U	10 U	11 U	10 UJ	10 U	10 U
Tetrachloroethane	2 U	2 U	2 U	11	2.2 U	2.5	2.2 U	2 UJ	2 U	2 U
Toluene	1.2 J	1.1 J	10 U	17	11 U	10 U	11 U	10 UJ	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Trichloroethane	1 U	1 U	1 U	6	1.1 U	4.4	1.1	1 UJ	1 U	1 U
Trichlorofluoromethane	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 UJ	10 U	10 U
Vinyl Chloride	10 U	1 U	1 U	1 U	1.1 U	10 U	11 U	1.5 B	10 U	10 U
Xylene (Total)	320	230	10 U	16000	11 U	10 U	11 U	1 UJ	1 U	10 U

DATA SUMMARY OF ANALYTICAL RESULTS  
SITE 5 SOIL SAMPLES  
NAS JRB WILLOW GROVE, WILLOW GROVE, PENNSYLVANIA

Sample ID:	05SB55-2223	05SB56-1011	05SB56-1920
Sample Date:	10/18/05	10/18/05	10/18/05
Duplicate Of:			
Top Depth (feet):	22.0	10.0	19.0
Bottom Depth (feet):	23.0	11.0	20.0
VOLATILES	ug/kg	ug/kg	ug/kg
1,1,1-Trichloroethane	10 UJ	10 U	10 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U
1,1,2-Trichlorotrifluoroethane	10 U	10 U	10 U
1,1-Dichloroethane	10 UJ	0.58 J	10 U
1,1-Dichloroethene	10 UJ	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U
1,2-Dichlorobenzene	10 U	10 U	10 U
1,2-Dichloroethane	1 UJ	7.8	3.7
1,2-Dichloroethene (cis)	10 UJ	10 U	10 U
1,2-Dichloroethene (trans)	10 UJ	10 U	10 U
1,2-Dichloropropane	2 U	2 U	2 U
1,3-Dichlorobenzene	10 U	10 U	10 U
1,4-Dichlorobenzene	1 U	1 U	1 U
2-Butanone	2.8 J	10 U	10 U
2-Hexanone	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U
Acetone	1 B	1.5 B	10 U
Benzene	2 UJ	2 U	2 U
Bromodichloromethane	1 U	1 U	1 U
Bromoform	5 U	5 U	5 U
Bromomethane	2 UJ	2 U	2 U
Carbon Disulfide	10 UJ	10 U	10 U
Carbon Tetrachloride	1 UJ	1 U	1 U
Chlorobenzene	10 U	10 U	10 U
Chloroethane	2 UJ	2 U	2 U
Chloroform	1 UJ	1 U	1 U
Chloromethane	10 UJ	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U
Cyclohexane	10 UJ	10 U	10 U
Dibromochloromethane	2 U	2 U	2 U
Dichlorodifluoromethane	10 UJ	10 U	10 U
Ethylbenzene	10 U	10 U	10 U
Isopropylbenzene	10 U	10 U	10 U
Methyl Acetate	5.2 J	10 U	10 U
Methyl Cyclohexane	10 UJ	10 U	10 U
Methyl Tert-butyl Ether	1 UJ	1 U	1 U
Methylene Chloride	8.7 B	6.4 B	6.7 B
Styrene	10 U	10 U	10 U
Tetrachloroethene	2 U	2 U	2 U
Toluene	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U
Trichloroethene	1 U	1 U	1 U
Trichlorofluoromethane	10 UJ	10 U	10 U
Vinyl Chloride	1 UJ	1 U	1 U
Xylene (Total)	10 U	10 U	10 U